SNAKEBITE MANAGEMENT: Experiences From Gulu Regional Hospital *Uganda*

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Background: The objective of this study was to document our experience with supportive therapy without antivenom in snakebite management.
Methods: In a prospective study undertaken at Gulu Regional Hospital, Northern Uganda from January to December 2002 the outcome of supportive therapy in management of 108 cases of snakebite was assessed.
Results: The lower extremity was involved in 106 patients (98.1%) and the upper extremity in the remaining two cases. Sixty-two patients (57.4 %) did not get any First Aid prior to admission. All Patients received supportive therapy. None of the patients received snake antivenom since it was unavailable at the hospital. All the 108 patients (100 %) improved and were discharged. The duration of hospital stay was 2 to 17 days with a mean of 3.8 days. Conclusion: Supportive therapy is simple, safe and effective treatment for snakebite without serious systemic poisoning.

Introduction

Snakebite is a frightening experience for the patient and is a medical emergency[1-5]. Poisonous snakebite can result in sudden death. Death can also result from shock due to fright (fright deaths) even when the bites were by non-poisonous snakes. Urgent therapeutic measures are therefore very important in the management[1-3]. Poisonous snakes have a pair of fangs projecting from the maxillae through which venom is injected into the victim during the bite[3-6]. Snakes are found throughout most parts of tropics and temperate zones[5]. Non-poisonous snakes have rows of teeth and these distinguishing features are important in the appropriate management of the victims of snakebites[3]. In United States, there are nearly 8000 poisonous snakebite cases per annum with 10-20 deaths[3,4]. Australia, which is another snake-inhabited country, has an annual incidence of about 3000 cases with 1 or 2 deaths[2]. The incidence of snakebite in Uganda is unknown.

The mortality rate of untreated poisonous snakebites is as high as 40-50 %[2]. Worldwide there are about 30000-40000 deaths from snakebites per annum[5]. Most deaths occur in children, the elderly, cases of delayed, inadequate or no treatment and religious sects who handle venomous snakes[1-6]. Non-poisonous snakebites may cause serious infection from bacteria such as clostridium and other anaerobes found in the snake's mouth.

Most snakebites follow accidental stepping on the snake by unprotected, bare footed persons[5]. Snakebite poisoning results from effects of venom injection (envenomation) into the victim. Venom can also be absorbed from cuts or scratches[5]. Venom is a complex mixture of toxic and enzymatic proteins. Effects of these toxins include; haemotoxicity-damage to blood vessels resulting in spontaneous systemic bleeding (petechiae, ecchymosis, haematemesis, haematuria, muscle paralysis, myolysis, haemolysis, arrhythmias and heart failure, renal failure from shock or haemoglobinuria. However, in up to 30% of poisonous snakebites envenomation does not occur. This is because poisonous snakes are not always charged with venom[2,3,7].

Manifestations of snakebite poisoning may be local and/or systemic[1-10]. Local symptoms and signs include presence of fang marks, local bleeding, local swelling (oedema), bruising or discoloration. Systemic features include persistent or transient hypotension (shock) syncope (fainting), nausea, vomiting, diarrhoea, excessive salivation, paralysis, coagulopathy, and systemic haemorrhage. The symptoms are at their worst 12-24 hours[2,3,5,6] following the bite and this allows for grading of snakebite severity to be done at the end of that period. Grading of levels envenomation can also be done using ELIZA[6] to determine venom antigen levels in the patients' serum. The level of envenomation correlates well with symptom severity

and is a good guide to patient management with antivenom, as higher grades require more antivenom[3,4,6].

Basic investigations[1-8] in snakebite include; full blood counts, blood grouping and cross-matching, prothrombin time, ECG, serum electrolytes, urea, creatinine and where available venom detection from the snakebite wounds, using venom detection kits[2].

The management of snakebite though urgent is controversial[1-10] in some aspects. The outcome however depends on the type of the snake and the levels of envenomation[2-5]. The mainstay of treatment for snakebite poisoning is antivenom[1-10]. However, First Aid in the field or at home is important and should include procedures such as splinting the bitten limb, wound dressing with a firm bandage, reassurance and immediate transport to a medical facility where supportive therapy and antivenom are available. Procedures such as application of a loose tourniquet proximal to the bite, incision and suction of the fang marks and excision of the fang marks are controversial but may be helpful in skilled hands. If the snake is killed it should be identified. If it is non-poisonous, reassuring the patients is important. For less seriously ill victims, general supportive treatment is sufficient[1-10]. The aims of this prospective study were to assess the outcome of supportive therapy in absence of antivenom in snakebite management at Gulu Regional Hospital.

Patients and methods

Between January and December 2002, there were 108 patients with snakebites admitted at Gulu Regional Hospital in Northern Uganda. The diagnosis was based on the history and/or the presence of fang marks. The patients' ages, sex, place of bite, residential address, time interval between snakebite and admission to hospital, type of First Aid received, symptoms, local and systemic signs of snakebite envenomation, type of treatment given, complications and duration of hospital stay were recorded.

Treatment included bed rest, limb elevation, reassurance and sedation with diazepam or promethazine, wound dressing with iodine, antibiotic prophylaxis, tetanus toxoid, analgesics, steroid therapy, observation with or without intravenous fluid administration. No antivenom was administered in all cases being unavailable in the hospital. Patients were discharged on recovery from local and systemic effects of snakebite. Data was analyzed to assess the outcome of supportive treatment.

Results

During the period under review, there were 1702 surgical admissions of which 108 (6.3%) had snakebites distributed throughout the year (Figure 1). The peak incidence was in the month of May. There were 47 males and 61 females (M: F= 1:1.3). The ages ranged from 1 year to 64 years with a mean of 24.5 years (Table 1). Most of the patients did not receive any First Aid prior to admission. The lower limb was bitten in 106 (98.1%) and the upper limb in 2 (1.9%). None of the 108 victims had protective foot ware at the time of the bite. Table 2 summarizes the presenting clinical features. All patients had fang-marks. While on the ward, wounds were cleaned with iodine or hibitane (0.5 %).

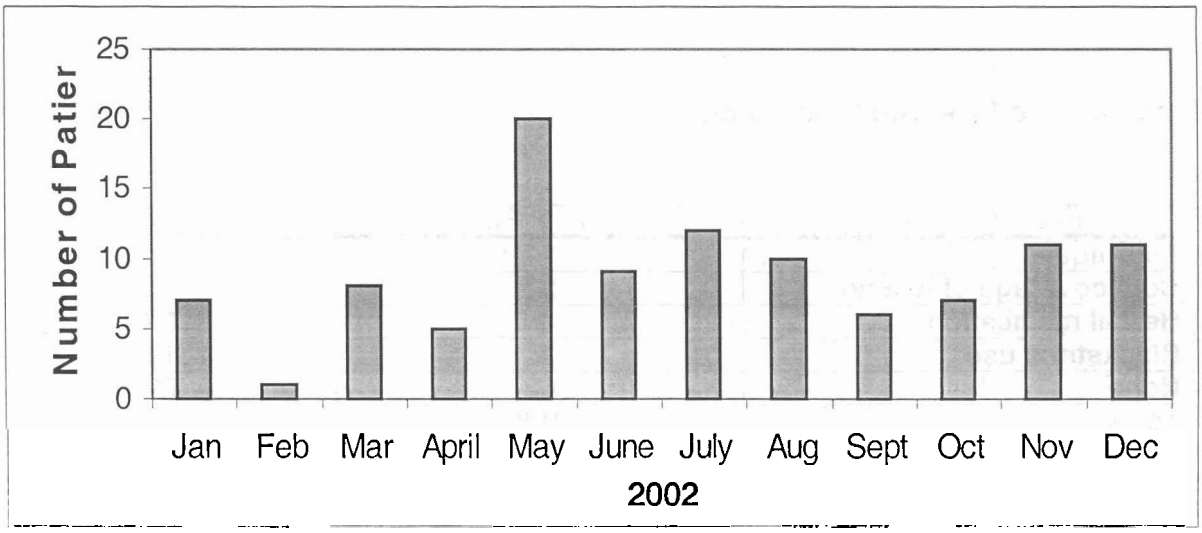

Figure 1: Monthly distribution of snakebites in 2002

Table 1: Age Distribution

Age in years	No. of Pts	%
Up to 10	13	12.0
11-20	31	28.7
21-30	35	32.4
31-40	18	16.7
41-50	5	4.6
51-60	5	4.6
61-70	1	1.0
Total	108	100

Table 2. Manifestations of Snakebite

Clinical Features	No of pts
Fang marks	108
Local swelling (oedema)	108
Local pain	108
Local bleeding	82
Headache	18
Nausea	13
Enlarged regional lymph nodes	11
Abdominal pain	5
Chest pain	4
Visual hallucinations	2
Agitation	2
Local cellulitis	2

Table 3. Field First Aid Treatment.

First Aid measure	No of Pts	%
Tourniquet	**17**	**15.7**
Coin coverage of wound	**21**	**19.4**
Herbal medication	**6**	**5.6**
Blackstone use	**2**	**1.9**
None	**62**	**57.4**
Total	108	100.0

Table 4. Hospital Treatment - General Supportive Therapy

1.	Bed rest
2.	Wound dressing (iodine, hibitane)
3.	Reassurance
4.	Sedation (Diazepam, Promethazine)
5.	Analgesics (ASA, Paracetamol, Ibuprofen, Indomethacin, Pethidine)
6.	Prophylactic antibiotics (PPF, Amoxycillin, Ampicillin, Gentamicin, Cloxacillin)
7.	Tetanus Toxoid
8.	Steroid (Hydrocortisone, Dexamethasone)
9.	Intravenous access (Fluids and Drugs)
10.	Debridement (N = 2)
11.	Limb Elevation
12.	Observation

Table 4 shows the supportive treatment given to the snakebite patients. The patients were monitored for any complications. Two patients had wound debridement following cellulitis that caused local tissue necrosis. All the 108 patients improved on treatment and were discharged. The duration of hospital stay ranged 2 and 17 days with an average of 3.8 days.

Discussion

Snakebite was seen throughout the year but had a peak during the wet and dry seasons, which are the cropping and harvest seasons respectively, when the barefooted peasants are busy in the snake - inhabited bushy fields in the rural areas[6]. All age groups were affected but the majority of the victims in our series were adults aged over 20 years. The slightly higher incidence among females is presumably due to the additional risk from outdoor activities such as gardening[6], collecting food or firewood from the fields or bushes[5]. Most of our patients had bites in the lower extremity which finding was in agreement with findings by other researchers[1-3]. Lack of protective foot-ware like leather boots while in a snake area is a predisposing factor to snakebite[3,5].

All the 108 patients in this study had local manifestation of poisonous snakebite but few had mild features of systemic poisoning. It is known that manifestations of snakebite depend on many factors but most importantly on the type of snake and the quantity of venom injected (level of envenomation or grade severity of snakebite)[3,5,6]. Snake type gives a clue to the venom-type and the nature of clinical manifestation in the victim. If the offending snake was not killed searching for it could probably result in a second bite[3,5]. It is however probable that the quantities of injected venom (levels of envenomation) were low leading to less serious symptoms and signs. Future studies in this aspect of snakebites should be encouraged.

The management of venomous snakebites is a medical emergency that requires immediate First Aid, general and specific measures[1-3]. The local traditional First Aid practices like strapping a coin or black stone against the snakebite wound, use of local topical medicaments are unconventional and unreliable and may result in complications. Although First Aid practices such as applying a loose tourniquet proximal to the bite, incision and suction of the wound, may be controversial[1-8], other practices such as immobilizing the bitten extremity, wound dressing after allowing local bleeding for 15-30 seconds are recommended as is the immediate transport of the victim to the nearest medical facility for definitive therapy[6]. Preventing exercise or exertion after snakebite minimizes systemic absorption of venom[2,3,6] . Incision and suction of the bite wound for 30 minutes and within 30 minutes of the snakebite may remove up to 50% of the venom. A Loose tourniquet (not arterial) applied within 30 minutes proximal to the bite to obstruct venous and lymphatic flow is

recommended in some series but it should not be kept for more than 4 hours. It should be removed as soon as antivenom is administered. However, the tourniquet should be removed gradually to avoid spilling of venom into the circulation.

General supportive therapy[1-8] has been effective in the management of snakebite patients with or without systemic poisoning; the former category of patients will in addition require antivenom treatment[1-10]. In this study supportive treatment was simple and only a few patients with systemic symptoms had I.V access for fluids and drugs for a day. It is possible in this study we did not get any patients with serious systemic poisoning. Presumably due to the snake type involved and perhaps small amount of venom injected. In practice, it is known that only 1 in 20 snakebite patients require active emergency management including antivenom therapy[2] which is the mainstay of treatment for snakebite with systemic poisoning[1-10]. Antivenom is available as monovalent (monospecific) and polyvalent preparations. It is prepared from horse serum and hypersensitivity, including anaphylaxis (incidence is under 1 %) can occur[1-9]. Antivenom should be administered either in the Emergency Room or Intensive Care Unit (ICU) where there are resuscitation facilities[2,3,6]. A test dose of 0.02 ml of antivenom diluted in 1:100 normal saline is given intradermally, with 0.25 mg of adrenaline ready in a syringe in case of anaphylaxis[2].

Other series recommend premeditation[2] for antivenom treatment as follows: non-sedating antihistamine e.g. promethazine 0.25 mg /kg, subcutaneous adrenaline 0.25 mg and I.V hydrocortisone 2 mg /kg. Antivenom is given by I.V drip in 500 mls of normal saline or 5 % Dextrose slowly[2,3,9] in not less than 1 hour or by slow push I.V injection not more than 2 ml / minute. The dose of antivenom is titrated against clinical response. Children get the same dose as adults. Initially 3-5 ampoules of antivenom will be required, 6-8 ampoules may be required later[3]. Serum sickness occurs up to 14 days after antivenom treatment and therefore steroid therapy (prednisolone 1mg/kg) and follow up are advised[2].

Conclusion

Snakebites are a public health hazard in Gulu, Northern Uganda. Supportive therapy is simple, safe and effective treatment for snakebites without serious systemic poisoning.

Recommendation

Although general supportive therapy is effective in less serious snakebites, antivenom should be readily available all the time for administration in cases of systemic snakebite poisoning.

- The public should be made aware of the burden of snakebites, their prevention and pre-hospital care.

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